

HazMats for Windshield Surveys

*How to Recognize and Assess a
Hazardous Material Incident*

Alan Jones, KD7KUS

What is a *windshield survey*?

- Drive around to identify hazardous or stricken situations following a disaster
- Binoculars, ERG, radio, knowledge & map are a must



What is a Hazardous Material?

Any substance or material which, if released in an uncontrolled manner can be harmful to people, animals, crops, water systems or other elements of the environment

Hazardous Materials (HazMats)

- Flammable – *It can burst into flames*
- Corrosive – *It can chemically burn your skin or clothing*
- Toxic – *It is poisonous*
- Reactive – *It can release lots of energy*
- Carcinogenic – *It can cause cancer*
- Oxidizer – *It can accelerate a fire or cause chemical burns*

HazMats Are Useful Chemicals

- We need and use hazardous materials everyday: gasoline, pesticides, battery components, cleaners
- When we use and store hazardous materials appropriately, they add to our quality of life
- When hazardous chemicals are used inappropriately or released from a controlled state, they can be dangerous

Gasoline: A HazMat



Very good gasoline

Bad, bad gasoline



Exposure Vectors

- Pathways that a hazmat takes to get into or onto your body
- Primary exposure vectors
 - Inhalation
 - Ingestion
 - Direct contact
 - Injection

What to Report to Fire Dept...

- Identify yourself
- Give your location and incident location
- Briefly describe what you see; e.g., liquid spill, gaseous cloud, placards
- If a gaseous cloud or liquid spill exists, give the direction and pertinent weather

Survey Safeguards

DO...

- report the nature of a hazmat incident to the fire department
- secure the scene from innocent bystanders
- stay upwind and uphill

DON'T...

- attempt to approach the incident
- attempt to plug a leak or right a spilled container
- rescue a hazmat-injured person

Fireman's Rule of Thumb



If you can't cover the scene with your thumb at arm's length, you're too close!!

HazMat Labels are Diamonds



- U.S. DOT requires hazmat labels
- All hazardous material labels are diamonds
- When surveying, search containers, tanks and railcars for diamond hazmat placards

Container Labels Are Key

- A placard on a tank or container will signal the primary hazard and exposure vector with a cartoon and in English
- A placard will indicate the UN hazard class with a number



Hazard Character: Poison



Hazard
Character:
Flammable



Hazard
Character:
Oxidizer



Hazard Character: Explosive



Hazard Character: Corrosive



Hazard Character: Infectious



Hazard Character: Radioactive



Hazard Character: Reactive



United Nations Hazard Classes

1. Explosives
2. Gases
3. Flammable Liquids
4. Flammable Solids
5. Oxidizing Substances and Organic Peroxides
6. Toxic or Infectious Substances
7. Radioactive
8. Corrosive
9. Miscellaneous Hazardous Materials

U.S. DOT Sub-Classes

1. Explosives
 - 1.1 Mass Explosion Hazard
 - 1.2 Projection Hazard
 - 1.3 Fire Hazard
 - 1.4 Insignificant Blast Hazard
 - 1.5 Insensitive Explosives / Blasting Agents
 - 1.6 Extremely Insensitive
2. Compressed Gas
 - 2.1 Flammable Gas
 - 2.2 Non-flammable Compressed Gas
 - 2.3 Poisonous Gas

U.S. DOT Sub-Classes

4. Flammable Solids

- 4.1 Flammable Solid

- 4.2 Spontaneously Combustible

- 4.3 Dangerous When Wet

5. Oxidizers

- 5.1 Oxidizers

- 5.2 Organic Peroxides

6. Poisons, Irritant & Etiologic Materials

- 6.1 Poisonous Materials

- 6.2 Infectious Substances

Reading a DOT Placard

Cartoon gives a quick hazard indication

The 4-digit DOT identification number

The UN hazard class number



Additional Placards



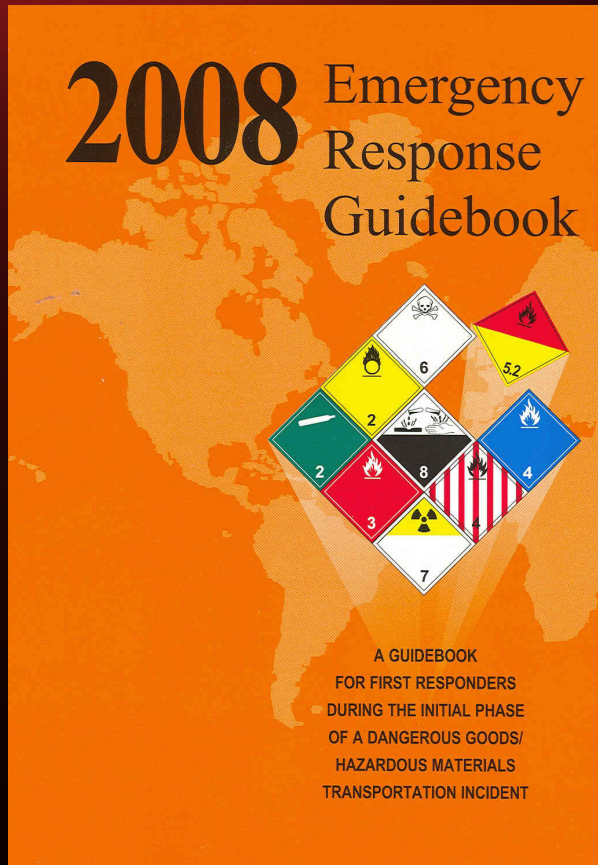
HazMat Placards



Interpreting a DOT Placard

1. To interpret the cartoon: Go to *Emergency Response Guidebook* pages 16 & 17 of the White Section
2. To interpret the 4-digit DOT Identification Number: Go to *ERG* Yellow Section
3. To interpret the U.N. or DOT number: Go to page 14 of the White Section

Emergency Response Guidebook



- The ERG is carried by bulk chemical carriers
- The ERG is useful if you can see a container label
- The ERG is divided into white, yellow, blue, orange and green sections
- The ERG identifies chemicals and hazards

Hazard Placards

TABLE OF PLACARDS AND INITIAL

USE THIS TABLE ONLY IF MATERIALS CANNOT BE SPECIFICALLY IDENTIFIED BY

This table lists 28 hazard placards arranged in a grid. Each placard is a diamond shape with a specific color and symbol. The initial is a number in a circle. The placards are: 111 (DANGER), 112 (EXPLOSIVE), 114 (EXPLOSIVE), 115 (EXPLOSIVE), 116 (EXPLOSIVE), 117 (EXPLOSIVE), 118 (EXPLOSIVE), 119 (EXPLOSIVE), 120 (EXPLOSIVE), 121 (NON-FLAMMABLE GAS), 122 (OXYGEN), 123 (TOXIC GAS), 124 (TOXIC GAS), 125 (TOXIC GAS), 126 (TOXIC GAS), 127 (COMBUSTIBLE), 128 (FUEL OIL), 129 (FLAMMABLE), 130 (FLAMMABLE), 131 (FLAMMABLE), 132 (FLAMMABLE), 133 (FLAMMABLE), 134 (FLAMMABLE), 135 (FLAMMABLE), 136 (FLAMMABLE), 137 (FLAMMABLE), 138 (FLAMMABLE), 139 (DANGEROUS), 140 (DANGEROUS), 141 (DANGEROUS), 142 (DANGEROUS), 143 (OXIDIZER), 144 (OXIDIZER), 145 (OXIDIZER), 146 (OXIDIZER), 147 (OXIDIZER), 148 (ORGANIC PEROXIDE), 149 (ORGANIC PEROXIDE), 150 (ORGANIC PEROXIDE), 151 (ORGANIC PEROXIDE), 152 (ORGANIC PEROXIDE), 153 (TOXIC), 154 (TOXIC), 155 (TOXIC), 156 (TOXIC), 157 (TOXIC), 158 (TOXIC), 159 (TOXIC), 160 (TOXIC), 161 (TOXIC), 162 (TOXIC), 163 (RADIOACTIVE), 164 (RADIOACTIVE), 165 (RADIOACTIVE), 166 (RADIOACTIVE), 167 (RADIOACTIVE), 168 (RADIOACTIVE), 169 (RADIOACTIVE), 170 (RADIOACTIVE), 171 (MARINE POLLUTANT).

RESPONSE GUIDE TO USE ON-SCENE

USING THE SHIPPING DOCUMENT, NUMBERED PLACARD, OR ORANGE PANEL NUMBER

This section provides a response guide for various hazard placards. It includes a table with columns for 'Hazard Placard' and 'Response'. The placards are arranged in a grid, and the response is provided for each. The placards are: 134 (FLAMMABLE SOLID), 136 (EXPLOSIVE), 139 (DANGEROUS), 143 (OXIDIZER), 148 (ORGANIC PEROXIDE), 153 (TOXIC), 154 (TOXIC), 155 (TOXIC), 156 (TOXIC), 157 (TOXIC), 158 (TOXIC), 159 (TOXIC), 160 (TOXIC), 161 (TOXIC), 162 (TOXIC), 163 (RADIOACTIVE), 164 (RADIOACTIVE), 165 (RADIOACTIVE), 166 (RADIOACTIVE), 167 (RADIOACTIVE), 168 (RADIOACTIVE), 169 (RADIOACTIVE), 170 (RADIOACTIVE), 171 (MARINE POLLUTANT).

Page 16

Page 17

White Section: Placards

- ERG white pages show hazard placards
- If you can only see a placard on a container spill, match it with these pages
- Placards are found on boxes, truck trailers, and railcars
- Notice the 3-digit number in a black circle by each placard
- The 3-digit number is a *Guide Number*.
- Look up the Guide Numbers in the Orange section.

Chemicals by ID Number

- Container labels will often have a 4-digit chemical ID number
- ID numbers are unique for individual chemicals or classes of chemicals
- Look up chemical ID numbers in the ERG Yellow section

ID No.	Guide No.	Name of Material	ID No.	Guide No.	Name of Material
2418	125	Sulfur tetrafluoride	2439	154	Sodium hydrogendifluoride
2418	125	Sulphur tetrafluoride	2440	154	Stannic chloride, pentahydrate
2419	116	Bromotrifluoroethylene	2440	154	Tin tetrachloride, pentahydrate
2420	125	Hexafluoroacetone	2441	135	Titanium trichloride, pyrophoric
2421	124	Nitrogen trioxide	2441	135	Titanium trichloride mixture, pyrophoric
2422	126	Octafluorobut-2-ene	2442	156	Trichloroacetyl chloride
2422	126	Refrigerant gas R-1318	2443	137	Vanadium oxytrichloride
2424	126	Octafluoropropane	2444	137	Vanadium tetrachloride
2424	126	Refrigerant gas R-218	2445	135	Lithium alkyls
2426	140	Ammonium nitrate, liquid (hot concentrated solution)	2445	135	Lithium alkyls, liquid
2427	140	Potassium chlorate, aqueous solution	2446	153	Nitrocresols
2427	140	Potassium chlorate, solution	2446	153	Nitrocresols, solid
2428	140	Sodium chlorate, aqueous solution	2447	136	Phosphorus, white, molten
2429	140	Calcium chlorate, aqueous solution	2447	136	White phosphorus, molten
2429	140	Calcium chlorate, solution	2447	136	Yellow phosphorus, molten
2430	153	Alkyl phenols, solid, n.o.s. (including C2-C12 homologues)	2448	133	Sulfur, molten
2431	153	Anisidines	2448	133	Sulphur, molten
2431	153	Anisidines, liquid	2451	122	Nitrogen trifluoride
2431	153	Anisidines, solid	2451	122	Nitrogen trifluoride, compressed
2432	153	N,N-Diethylaniline	2452	116P	Ethylacetylene, stabilized
2433	152	Chloronitrotoluenes	2453	115	Ethyl fluoride
2433	152	Chloronitrotoluenes, liquid	2453	115	Refrigerant gas R-161
2433	152	Chloronitrotoluenes, solid	2454	115	Methyl fluoride
2434	156	Dibenzylchlorosilane	2454	115	Refrigerant gas R-41
2435	156	Ethylphenyldichlorosilane	2455	116	Methyl nitrite
2436	129	Thioacetic acid	2456	130P	2-Chloropropene
2437	156	Methylphenyldichlorosilane	2457	128	2,3-Dimethylbutane
2438	132	Trimethylacetyl chloride	2458	130	Hexadiene
			2459	128	2-Methyl-1-butene
			2460	128	2-Methyl-2-butene
			2461	128	Methylpentadiene
			2463	138	Aluminum hydride

Page 58

Chemicals by Name

Name of Material	Guide No.	ID No.	Name of Material	Guide No.	ID No.
Ethylene oxide and Carbon dioxide mixture, with more than 9% but not more than 87% Ethylene oxide	115	1041	Ethyl ether	127	1155
Ethylene oxide and Carbon dioxide mixture, with more than 87% Ethylene oxide	119P	3300	Ethyl fluoride	115	2453
Ethylene oxide and Carbon dioxide mixtures, with more than 6% Ethylene oxide	115	1041	Ethyl formate	129	1190
Ethylene oxide and Carbon dioxide mixtures, with not more than 6% Ethylene oxide	126	1952	Ethylhexaldehydes	129	1191
Ethylene oxide and Carbon dioxide mixtures, with not more than 9% Ethylene oxide	126	1952	2-Ethylhexylamine	132	2276
Ethylene oxide and Chlorotetrafluoroethane mixture, with not more than 8.8% Ethylene oxide	126	3297	2-Ethylhexyl chloroformate	156	2748
Ethylene oxide and Dichlorodifluoromethane mixture, with not more than 12.5% Ethylene oxide	126	3070	Ethyl isobutyrate	129	2385
Ethylene oxide and Dichlorodifluoromethane mixtures, with not more than 12% Ethylene oxide	126	3070	Ethyl isocyanate	155	2481
Ethylene oxide and Pentafluoroethane mixture, with not more than 7.9% Ethylene oxide	126	3298	Ethyl lactate	129	1192
Ethylene oxide and Propylene oxide mixture, with not more than 30% Ethylene oxide	129P	2983	Ethyl mercaptan	129	2363
Ethylene oxide and Tetrafluoroethane mixture, with not more than 5.6% Ethylene oxide	126	3299	Ethyl methacrylate	130P	2277
Ethylene oxide with Nitrogen	119P	1040	Ethyl methacrylate, stabilized	130P	2277
			Ethyl methyl ether	115	1039
			Ethyl methyl ketone	127	1193
			Ethyl nitrite, solution	131	1194
			Ethyl orthoformate	129	2524
			Ethyl oxalate	156	2525
			Ethylphenyldichlorosilane	156	2435
			Ethyl phosphonothioic dichloride, anhydrous	154	2927
			Ethyl phosphonous dichloride, anhydrous	135	2845
			Ethyl phosphorodichloridate	154	2927
			1-Ethylpiperidine	132	2386
			Ethyl propionate	129	1195
			Ethyl propyl ether	127	2615
			Ethyl silicate	129	1292
			Ethylsulfuric acid	156	2571
			Ethylsulphuric acid	156	2571
			N-Ethyltoluidines	153	2754
			Ethyltrichlorosilane	155	1196
			Explosive A	112	—
			Explosive B	112	—

Page 121

- Container labels will usually list the chemical's name
- Look up a chemical's name in the ERG Blue section

ERG Hazards: Orange Section

- When you have the 3-digit Guide Number (from consulting the container label and the ERG white, yellow or blue section), then
- Look up the Guide Number in the orange section (see next slide for Orange).
- The Orange section reveals potential hazards, personal protective equipment, and the appropriate emergency response

Orange: Potential Hazards & Emergency Response

GUIDE 124 GASES - TOXIC AND/OR CORROSIVE - OXIDIZING ERG2004

POTENTIAL HAZARDS

HEALTH

- **TOXIC;** may be fatal if inhaled or absorbed through skin.
- Fire will produce irritating, corrosive and/or toxic gases.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Runoff from fire control may cause pollution.

FIRE OR EXPLOSION

- Substance does not burn but will support combustion.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- These are strong oxidizers and will react vigorously or explosively with many materials including fuels.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Some will react violently with air, moist air and/or water.
- Cylinders exposed to fire may vent and release toxic and/or corrosive gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

PUBLIC SAFETY

- **CALL** Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances.

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

Page 196

ERG2004 GASES - TOXIC AND/OR CORROSIVE - OXIDIZING **GUIDE 124**

EMERGENCY RESPONSE

FIRE

Small Fires: Water only; no dry chemical, CO₂ or Halon®.

- Contain fire and let burn. If fire must be fought, water spray or fog is recommended.
- Do not get water inside containers.
- Move containers from fire area if you can do it without risk.
- Damaged cylinders should be handled only by specialists.

Fire Involving Tanks

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- **ALWAYS** stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- Do not touch or walk through spilled material.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Do not direct water at spill or source of leak.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Isolate area until gas has dispersed.
- Ventilate the area.

FIRST AID

- Move victim to fresh air. • Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Clothing frozen to the skin should be thawed before being removed.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Keep victim warm and quiet. • Keep victim under observation.
- Effects of contact or inhalation may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Page 197

Green: Initial Isolation & Protective Action Distances

Page 320

TABLE OF INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES

ID No.		NAME OF MATERIAL	SMALL SPILLS (From a small package or small leak from a large package)						LARGE SPILLS (From a large package or from many small packages)					
			First ISOLATE in all Directions		Then PROTECT persons Downwind during:				First ISOLATE in all Directions		Then PROTECT persons Downwind during:			
					DAY		NIGHT				DAY		NIGHT	
			Meters	(Feet)	Kilometers (Miles)	Kilometers (Miles)	Kilometers (Miles)	Kilometers (Miles)	Meters	(Feet)	Kilometers (Miles)	Kilometers (Miles)	Kilometers (Miles)	Kilometers (Miles)
2204	Carbonyl sulfide	30 m	(100 ft)	0.1 km	(0.1 m)	0.6 km	(0.4 mi)	300 m	(1000 ft)	3.0 km	(1.9 mi)	8.1 km	(5.0 mi)	
2204	Carbonyl sulphide													
2232	Chloroacetaldehyde	30 m	(100 ft)	0.2 km	(0.1 mi)	0.3 km	(0.2 mi)	90 m	(300 ft)	0.8 km	(0.5 mi)	1.8 km	(1.0 mi)	
2232	2-Chloroethanal													
2334	Allylamine	30 m	(100 ft)	0.1 km	(0.1 mi)	0.5 km	(0.3 mi)	120 m	(400 ft)	1.1 km	(0.7 mi)	2.5 km	(1.5 mi)	
2337	Phenyl mercaptan	30 m	(100 ft)	0.1 km	(0.1 mi)	0.1 km	(0.1 mi)	60 m	(200 ft)	0.4 km	(0.2 mi)	0.6 km	(0.4 mi)	
2382	1,2-Dimethylhydrazine	30 m	(100 ft)	0.1 km	(0.1 mi)	0.2 km	(0.1 mi)	60 m	(200 ft)	0.6 km	(0.4 mi)	1.2 km	(0.8 mi)	
2382	Dimethylhydrazine, symmetrical													
2407	Isopropyl chloroformate	30 m	(100 ft)	0.1 km	(0.1 mi)	0.3 km	(0.2 mi)	90 m	(300 ft)	0.7 km	(0.5 mi)	1.5 km	(0.9 mi)	
2417	Carbonyl fluoride	30 m	(100 ft)	0.2 km	(0.1 mi)	1.1 km	(0.7 mi)	90 m	(300 ft)	1.0 km	(0.6 mi)	3.6 km	(2.3 mi)	
2417	Carbonyl fluoride, compressed													
2418	Sulfur tetrafluoride	60 m	(200 ft)	0.7 km	(0.4 mi)	3.2 km	(2.0 mi)	500 m	(1600 ft)	4.7 km	(2.9 mi)	10.6 km	(6.6 mi)	
2418	Sulphur tetrafluoride													
2420	Hexafluoroacetone	30 m	(100 ft)	0.3 km	(0.2 mi)	1.3 km	(0.8 mi)	800 m	(2500 ft)	7.2 km	(4.5 mi)	11.0+ km	(7.0+ mi)	
2421	Nitrogen trioxide	30 m	(100 ft)	0.1 km	(0.1 mi)	0.5 km	(0.3 mi)	60 m	(200 ft)	0.4 km	(0.3 mi)	1.9 km	(1.2 mi)	
2437	Methylphenyldichlorosilane (when spilled in water)	30 m	(100 ft)	0.1 km	(0.1 mi)	0.1 km	(0.1 mi)	30 m	(100 ft)	0.3 km	(0.2 mi)	1.1 km	(0.7 mi)	
2438	Trimethylacetyl chloride	30 m	(100 ft)	0.1 km	(0.1 mi)	0.2 km	(0.1 mi)	60 m	(200 ft)	0.5 km	(0.3 mi)	0.8 km	(0.5 mi)	
2442	Trichloroacetyl chloride	30 m	(100 ft)	0.2 km	(0.2 mi)	0.8 km	(0.5 mi)	120 m	(400 ft)	1.2 km	(0.8 mi)	2.2 km	(1.4 mi)	
2474	Thiophosgene	90 m	(300 ft)	0.8 km	(0.5 mi)	2.4 km	(1.5 mi)	360 m	(1200 ft)	3.6 km	(2.3 mi)	6.8 km	(4.2 mi)	
2477	Methyl isothiocyanate	30 m	(100 ft)	0.1 km	(0.1 mi)	0.2 km	(0.1 mi)	60 m	(200 ft)	0.5 km	(0.3 mi)	1.0 km	(0.7 mi)	
2480	Methyl isocyanate	60 m	(200 ft)	0.5 km	(0.3 mi)	1.9 km	(1.2 mi)	600 m	(1800 ft)	5.4 km	(3.3 mi)	11.0+ km	(7.0+ mi)	

Page 321

2481	Ethyl isocyanate	60 m	(200 ft)	0.6 km	(0.4 mi)	2.1 km	(1.3 mi)	800 m	(2500 ft)	6.2 km	(3.9 mi)	11.0+ km	(7.0+ mi)
2482	n-Propyl isocyanate	120 m	(400 ft)	1.0 km	(0.7 mi)	2.5 km	(1.6 mi)	1000 m	(3000 ft)	9.0 km	(5.6 mi)	11.0+ km	(7.0+ mi)
2483	Isopropyl isocyanate	120 m	(400 ft)	1.1 km	(0.7 mi)	2.8 km	(1.8 mi)	1000 m	(3000 ft)	11.0+ km	(7.0+ mi)	11.0+ km	(7.0+ mi)
2484	tert-Butyl isocyanate	90 m	(300 ft)	1.0 km	(0.6 mi)	2.4 km	(1.5 mi)	1000 m	(3000 ft)	8.4 km	(5.2 mi)	11.0+ km	(7.0+ mi)
2485	n-Butyl isocyanate	90 m	(300 ft)	0.7 km	(0.5 mi)	1.6 km	(1.0 mi)	500 m	(1600 ft)	4.7 km	(2.9 mi)	8.0 km	(5.0 mi)
2486	Isobutyl isocyanate	90 m	(300 ft)	0.7 km	(0.5 mi)	1.6 km	(1.0 mi)	500 m	(1600 ft)	4.7 km	(3.0 mi)	7.8 km	(4.8 mi)
2487	Phenyl isocyanate	30 m	(100 ft)	0.4 km	(0.2 mi)	0.5 km	(0.3 mi)	180 m	(600 ft)	1.6 km	(1.0 mi)	2.9 km	(1.8 mi)
2488	Cyclohexyl isocyanate	30 m	(100 ft)	0.2 km	(0.2 mi)	0.3 km	(0.2 mi)	90 m	(300 ft)	0.9 km	(0.6 mi)	1.6 km	(1.0 mi)
2495	Iodine pentafluoride (when spilled in water)	30 m	(100 ft)	0.2 km	(0.1 mi)	1.0 km	(0.6 mi)	210 m	(700 ft)	1.9 km	(1.2 mi)	5.7 km	(3.6 mi)
2521	Diketene, inhibited	30 m	(100 ft)	0.1 km	(0.1 mi)	0.1 km	(0.1 mi)	30 m	(100 ft)	0.3 km	(0.2 mi)	0.5 km	(0.3 mi)
2521	Diketene, stabilized												
2534	Methylchlorosilane	30 m	(100 ft)	0.2 km	(0.1 mi)	0.8 km	(0.5 mi)	240 m	(800 ft)	2.4 km	(1.5 mi)	6.4 km	(4.0 mi)
2548	Chlorine pentafluoride	30 m	(100 ft)	0.3 km	(0.2 mi)	1.7 km	(1.1 mi)	240 m	(800 ft)	2.4 km	(1.5 mi)	7.4 km	(4.6 mi)
2600	Carbon monoxide and Hydrogen mixture	30 m	(100 ft)	0.1 km	(0.1 mi)	0.1 km	(0.1 mi)	90 m	(300 ft)	0.7 km	(0.4 mi)	2.4 km	(1.5 mi)
2600	Carbon monoxide and Hydrogen mixture, compressed												
2600	Hydrogen and Carbon monoxide mixture												
2600	Hydrogen and Carbon monoxide mixture, compressed												
2605	Methoxymethyl isocyanate	60 m	(200 ft)	0.4 km	(0.2 mi)	0.6 km	(0.4 mi)	180 m	(600 ft)	1.6 km	(1.0 mi)	2.6 km	(1.6 mi)
2606	Methyl orthosilicate	30 m	(100 ft)	0.1 km	(0.1 mi)	0.1 km	(0.1 mi)	60 m	(200 ft)	0.4 km	(0.3 mi)	0.7 km	(0.4 mi)
2644	Methyl iodide	30 m	(100 ft)	0.1 km	(0.1 mi)	0.2 km	(0.1 mi)	30 m	(100 ft)	0.3 km	(0.2 mi)	0.8 km	(0.5 mi)
2646	Hexachlorocyclopentadiene	30 m	(100 ft)	0.1 km	(0.1 mi)	0.1 km	(0.1 mi)	60 m	(200 ft)	0.4 km	(0.3 mi)	0.5 km	(0.3 mi)
2666	Chloroacetonitrile	30 m	(100 ft)	0.1 km	(0.1 mi)	0.1 km	(0.1 mi)	30 m	(100 ft)	0.3 km	(0.2 mi)	0.5 km	(0.3 mi)

To Obtain an ERG:

1-800-327-6868

www.jjkeller.com

Pocket-size: \$3.39 ea. (soft-bound)

Standard size: \$7.29 ea. (spiral-bound or
soft-bound)

Dangerous Situations

Rail cars that
are buckled or
evidence
signs of heat
stress



Intermodal Containers



Dangerous Situations



Rounded ends
on a tanker
indicate
higher
pressure

Emergency Shut-Off Valves



Underground Chemicals



We have underground petroleum pipelines in our area – Remember Bellingham!

Other Pipelines



Stationary Tanks



BLEVE:

Boiling Liquid Explosive Vapor Explosion

The most feared of all
chemical/fire situations



Alan Jones, KD7KUS

Owner / Principal

Hospital Waste Management

AlanBJones@verizon.net

<http://www.hospitalwastemgmt.com>

